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OUTBREAK OF ECHOVIRUS 30 MENINGITIS IN SOUTHERN SASKATCHEWAN

Background

Enteroviruses comprise a major subgroup of small RNA viruses that readily infect humans and are shed from the intestinal tract[1]. They include polioviruses, coxsackieviruses, echoviruses, and several other viruses. Enteroviruses are generally resistant to common disinfectants such as 70% ethanol, substituted phenolics, and other detergents[1]. This obviates the need for proper cleaning for infection control. Chlorine in concentrations of 0.3 ppm to 0.5 ppm is effective in destroying this agent[1]. These viruses have a worldwide distribution[1,2]. Asymptomatic infection is common[1]. Spread is primarily fecal-oral and respiratory[1]. They follow a cyclical pattern for epidemics[1]. In North America, the peak time of year for infections is summer and fall[1,2]. These viruses can persist in the oropharynx for 1 week to 4 weeks and in the feces for 1 week to 18 weeks after the acute infection[1]. Incubation periods vary depending on the agent; 2 to 10 days is typical[1,2].

Echovirus 30 is associated primarily with aseptic meningitis and encephalitis[1]. The clinical spectrum of disease is quite varied with up to 60% of infections being subclinical[1]. The disease tends to be mild and self-limited, with most patients making a full recovery within 2 weeks[1,2]. In 1996, there were no cases of echovirus 30 reported in Saskatchewan; in 1997, there were 10[3]. In Canada in 1996, there was only one case of echovirus 30 reported; in 1997, there were 225[3].

The outbreak

The case definition for confirmed cases was an isolate of echovirus 30 and consistent symptoms of meningitis including headache, fever, and stiff neck. The case definition for suspect cases was symptoms of headache, fever, and stiff neck, with absence of an isolate of echovirus 30 and no other obvious explanation for the observed symptoms.

Thirty-seven cases of suspect viral meningitis were reported to the Moose Jaw-Thunder Creek Health District between 21 July to 27 August 1998. All but two of the cases had been hospitalized. Twenty-two of these were subsequently confirmed as being echovirus 30 as assessed by viral culture. Table 1 shows the age distribution of the 37 cases. The epidemic curve is shown in Figure 1. Six cases were linked to close household or playmate contact. Seven cases clustered from 30 July to 1 August 1998 and had in common camping at a provincial campground in the district. An investigation of the linkage between these cases, examining swimming pool exposures, drinking water exposures, and use of a pit toilet (with no hand washing readily available) was done by Saskatchewan Health and the Moose Jaw-Thunder Creek Health District. Results will be presented in a later paper. The remaining 24 cases had no obvious factors linking them to known cases.

Table 1
Age breakdown of reported cases of echovirus 30 meningitis, southern Saskatchewan, 21 July to 27 August 1998

Age Group (years)	Number of Cases (% of total cases)
< 5	2 (5.4)
5-10	19 (51.4)
11-15	8 (21.6)
15-19	2 (5.4)
≥ 20	6 (16.2)
Total	**37 (100)**

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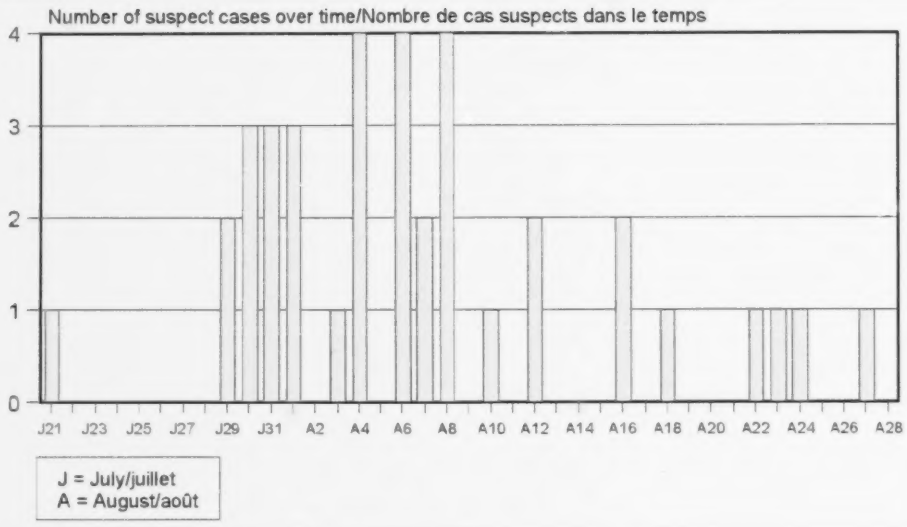
Figure 1
Epidemic curve of an echovirus 30 meningitis outbreak, southern Saskatchewan, 21 July to 27 August 1998



Public-health response

Given the great potential for public alarm, a proactive media communications plan was put into place as soon as the second case was reported. It involved press releases to the local media, interviews with local and provincial radio and television stations, and community information fora. Key messages emphasized the differences between bacterial and viral meningitis and methods of prevention (stressing hand washing and not sharing food or drink).

Given that the peak season for enteroviral meningitis extends into the school season, there was great potential for spread because of students gathering together in large numbers. A proactive information plan for schools was put into place before the beginning of the school year. All directors of school boards in the District met with the medical health officer 2 weeks before the school year started. The situation was explained and a package for distribution was supplied. The directors distributed the package to all the principles in their board, who then disseminated the appropriate information to parents and teachers. The package contained a general information letter to the principal, a lesson plan on viral meningitis for teachers (which was provided by the Regina Health District and used successfully in a previous campaign there), stickers and posters on prevention, and an information letter to parents. On request, public-health nurses and public-health inspectors were available to meet with principles and teachers in all schools to answer questions. Sanitation in the schools was also increased. Common surfaces were wiped down at least once per day with a solution of one part bleach to 10 parts water. Special attention was paid to bathroom and water fountain surfaces.

This information plan was very well received. Although the school season was expected to bring a large increase in cases with the increased mixing of children, the epidemic stopped shortly after children started school.

Discussion

This year, a large number of cases of echovirus 30 meningitis have occurred in North America. From 1 January to 10 September 1998, over 170 cases of suspect viral meningitis have been reported to Calgary Regional Health Authority; several have been confirmed as echovirus 30 (G. Normandine, Calgary Regional Health Authority, Calgary: personal communication, 1998). South Dakota reported 121 cases of aseptic meningitis from 15 April to 31 July 1998 (58 of these were isolated as echoviruses and close to one-half were echovirus 30), and several sporadic increases have been reported across America[4]. Although severe complications are rare with echovirus 30 meningitis, they still occur. With greater numbers of infections, one would be more likely to see cases with complications. Therefore, a systematic approach to preventive education should be undertaken by public-health organizations. The campaign in Moose Jaw-Thunder Creek Health District seems to have worked well and may serve as a model for other communities.

The reason for the increased rates in North America this year is not clear. Echoviruses are diverse and appear to follow a periodicity for epidemics caused by particular strains. This year, echovirus 30 seems to be prevalent. Its widespread prevalence raises the question of whether a mutation has increased its survivability or whether the uncharacteristically warm weather conditions this summer created favourable conditions for its environmental persistence resulting in an increased likelihood of transmission.

References

1. Ray CG. *Enteroviruses.* In: Sherris JC, ed. *Medical microbiology – an introduction to infectious diseases.* 2nd ed. New York: Elsevier Science Publishing Company Inc., 1990:537-46.
2. Benenson AS, ed. *Meningitis.* In: *Control of communicable diseases manual.* 16th ed. Washington DC: American Public Health Association, 1995:301-03.
3. LCDC. *Laboratory evidence of human viral infections in Canada, annual reports (1996, 1997).* URL: ttp://www.hc-gc.gc.ca/hpb/lcdc/bmb/virusrep/index.html. Date of access: 11 Sept. 1998.
4. Parker SL. *Aseptic meningitis – South Dakota.* URL: http://www.healthnet.org/programs/promed.html. Date of access: 11 Aug. 1998.

Source: *R Ramsingh, MD, Medical Health Officer, Moose Jaw-Thunder Creek Health District, Moose Jaw, Saskatchewan.*

International Notes

ASEPTIC MENINGITIS DUE TO ECHOVIRUS 30, JAPAN, 1997-1998

There have been three nationwide epidemics of aseptic meningitis due to echovirus 30 (E30) in Japan since the start of the national epidemiologic surveillance of infectious diseases (NESID)*: in 1983, 1989-1991, and 1997-1998.

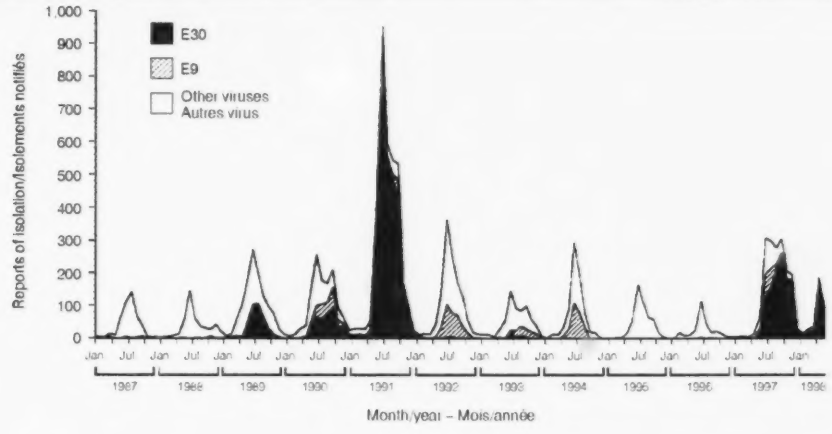
Reports of aseptic meningitis cases started to increase in June 1997, reaching a peak in August-September. Unlike the usual epidemics, a very large number of reports were received during October-December, as in 1991. The annual number of cases in 1997 totalled 3,328, the fourth largest number after 7,672 in 1991, 4,753 in 1989, and 3,485 in 1990. Those aged 0 to 4 years accounted for 42% of the cases; those aged 5 to 9 for 39%; those aged 10 to 14 for 9.8%; and those aged ≥ 15 for 8.4%.

Figure 1 shows the trend of reports on virus isolation from meningitis cases. The viral agents of meningitis comprise mainly echoviruses and group B coxsackieviruses, the most important agent being E30 (which caused a particularly large-scale epidemic in 1991). Whereas during the 1989-1991 epidemic, reports of isolation of E30 started to increase in June (attaining the highest number in July-August), in 1997 reports started to increase in July, attaining the highest number in October, after which isolation of E30 was steady until it again increased suddenly in May 1998. Further increases were noted in June.

E30 was isolated from 1,335 cases during January-December 1997. The clinical diagnoses made were meningitis in 1,128 cases (84%) accounting for a high proportion as in past epidemics (Table 1). Encephalopalopathy/encephalomyelitis was reported in six cases, and encephalopathy in one case. During 1982-1996, encephalitis/ encephalomyelitis was reported in 37 of 7,675 cases from which E30 was isolated.

The age distribution of the cases was very similar to the 1989-1991 epidemic: those aged 3 to 7 years (with a peak at age 5) accounted for 62%. It is considered that E30 infection occurs

Figure 1
Virus isolation from meningitis cases, Japan, 1987-1998†



† Based on reports received as of 21 July 1998. Selon des rapports communiqués jusqu'au 21 juillet 1998.

* In compliance with the NESID programme of the Japanese Ministry of Health and Welfare, about 500 sentinel hospitals report incidence of aseptic meningitis cases based on provisional clinical diagnosis every month and collect specimens for infectious agents surveillance. Prefectural and municipal public-health institutes isolate and identify the viral agents of aseptic meningitis and report the results of positive isolation to the *Infectious agents surveillance report.*

Table 1
Annual reports of echovirus 30 isolation, Japan, 1982-1998[1]

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998[1]
Annual total	**9**	**615**	**66**	**1**	**102**	**10**	**12**	**525**	**573**	**4 063**	**63**	**93**	**8**	**4**	**4**	**1,335**	**432**
Meningitis cases	4	477	57	–	78	10	9	384	411	2 977	38	71	1	–	2	1,128	323

[1] Based on reports received as of 21 July 1998.

principally in young children born after the last epidemic, but 3.9% of cases occurred in those aged ≥ 15. The viruses isolated from adult meningitis cases (37 cases aged 20 to 59) were all E30. Of the cases from which E30 was isolated, 44 were of familial outbreaks and 52 of other outbreaks.

E30 has often been isolated from cerebrospinal fluid, which characterizes the past epidemics. In the present epidemic, E30 was isolated from cerebrospinal fluid in 925 cases (69%), from nasopharyngeal specimens in 544 cases (41%), and from stool specimens in 282 cases (21%).

Analyses of the current epidemic strains for gene nucleotide sequences and neutralization antigenicities are in progress at Japanese public-health institutes and at the National Institute of Infectious Diseases.

Source: *WHO Weekly Epidemiological Record, Vol 73, No 36, 1998.*

OUTBREAK OF QUINOLONE-RESISTANT, MULTIRESISTANT *SALMONELLA TYPHIMURIUM* DT104, DENMARK

Since the beginning of the 1990s infection with the zoonotic *Salmonella* type *S. typhimurium* DT104 has been recognized as a health problem in several industrialized countries*. *S. typhimurium* DT104 has a broad spectrum of hosts and can easily spread to a large number of domestic animals, as well as to wild animals. Because of its extensive reservoir, *S. typhimurium* DT104 is difficult to control in animal farming. It is often resistant to ampicillin, chloramphenicol, streptomycin, sulphonamides, and tetracycline. In addition, the organism can acquire resistance to other antibacterial agents, including quinolones. As a fluoroquinolone is the drug of first choice for treating extra-intestinal and serious intestinal complications of human salmonellosis, this can cause therapeutic problems. In England, multiresistant *S. typhimurium* DT104 is the second most common *Salmonella* sero- and phage type after *S. enteritidis* DT104.

In Denmark, the proportion of *S. typhimurium* DT104 infections had hitherto been less than 1% of total human *Salmonella* infections, and apart from a small hospital outbreak in 1996, only sporadic cases had been recorded. From 1995 to 1997, there had been no increase in human cases, and no quinolone-resistant strains had been isolated[(1)].

The outbreak

In the summer of 1998, the first community outbreak of multidrug-resistant *S. typhimurium* DT104 was registered, the source being pork meat of Danish origin. Most cases occurred during the week starting 1 June. This coincided with the identification of the same type of *Salmonella* in meat at a slaughterhouse on 25 May. The cases reported from 29 June onwards are presumably due to the use of frozen meat.

The organism involved showed the classic resistance pattern, but was also resistant to a quinolone, nalidixic acid. This outbreak constitutes an example to illustrate that problems with the treatment of human infections can be related to the occurrence of quinolone-resistant bacteria in live animals and food products.

Investigation of the outbreak

The outbreak was confirmed at Statens Serum Institut on 18 June 1998. Isolate from five patients with *S. typhimurium* DT104 infection showed the unusual resistance pattern (nalidixic acid resistance) which exactly corresponded to that found in isolates from a slaughterhouse in Zealand, as well as in isolates collected by food inspection agencies in Copenhagen and Roskilde. This resistance profile had not been detected in Danish food animals or food previously, and only rarely in humans. Subsequent investigations confirmed that all isolates were of phage type 104 and had the same DNA-fingerprinting pattern.

A connection between the finding of nalidixic acid-resistant *S. typhimurium* DT104 both in fresh pork and in these patients was further supported by patient interviews, which revealed that patients had bought and eaten pork from shops that had received deliveries from the slaughterhouse in question. Furthermore, the farm that had sent the pigs to the slaughterhouse was identified,

* For more information on the use of quinolones in food and their potential impact on human health, please refer to: *The medical impact of the use of the use of antimicrobials in food animals* (document WHO/EMC/ZOO/97.4), *The use of quinolones in food animals and potential impact on human health* (document WHO/EMC/ZDI/98.10) and *Multidrug resistant Salmonella typhimurium* (Fact Sheet No. 139, January 1997), all available from the Division of Emerging and Other Communicable Diseases Surveillance and Control, World Health Organization, 1211 Geneva 27, Switzerland; and Website <www.who.int/emc/diseases/zoo>.

and *Salmonella* isolates from the same herd were found to be identifical to isolates from the slaughterhouse, the pork, and the patients. This strain was also found in another herd of pigs from which the index stock had received piglets.

All 22 cases were probably part of the same outbreak, as the resistance profile of the 22 isolates was very unusual. This conjecture has been supported by molecular epidemiologic investigations carried out in collaboration with the Danish Veterinary Laboratory. Eighteen of the 22 patients were interviewed, and nine provided information that directly revealed that they had eaten pork originating from the slaughterhouse concerned. One of the patients was a slaughterhouse employee who was presumably infected at work, and another was a hospital employee who had had contact with one of the other patients. It should be stressed that none of the patients had been abroad. Of the seven patients admitted to hospital, six were treated with antibiotics, including fluoroquinolones. Several of the cases have had severe intestinal disease and fluoroquinolone treatment has been reported to lack clinical effect in at least four cases.

A previously healthy 62-year-old woman died from the complications of intestinal perforation. The patient had been treated with fluoroquinolone for 5 days before operation and was treated per- and postoperatively with ceftriaxone and gentamicin. In addition, *Bacteroides fragilis*, which was resistant to the antibiotics given, was isolated from blood culture.

Reference

1. *Annual report on zoonoses in Denmark 1997.* Copenhagen: Danish Zoonosis Centre, 1998.

Source: *WHO Weekly Epidemiological Record, Vol 73, No 42, 1998.*

Announcement

MEDICAL SERVICES BRANCH – RESEARCH PROPOSALS

The Medical Services Branch (MSB) is currently accepting research proposals contributing to the prevention and control of tuberculosis among Aboriginal peoples in Canada.

The selection process will be based on the degree of participation of Aboriginal people and of respect for culture, values, beliefs, and traditions. This request for proposals is open to all groups participating in research.

Candidates must submit a printed copy of their completed proposal. Proposals should include the primary investigator, and a description of the objectives, methods, budget, and timeline. They must be received by Health Canada no later than 1 March 1999. Research projects must begin 1 April 1999 and be completed by 31 March 2000.

Please send proposals to

MSB Advisory Group for the Elimination of Tuberculosis
c/o Beth Kwavnick
Jeanne Mance Building
Postal locator 1920D, Tunney's Pasture
Ottawa ON
K1A 0L3

Erratum

INFLUENZA IN CANADA – 1997-1998 SEASON Vol. 24-21, page 171

In table 2 on page 171, the number of type B cases listed under AB **(3)** should have been listed under BC, and the number of type B cases listed under BC **(22)** should have been listed under **Total**.

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